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Personnel Data Congruence Between SAMS and CHCS

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Clinical Investigation Program Statement

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Introduction

This was a preliminary study needed to develop a shipboard chronic disease condition prevalence study. The purpose of this study was to describe the percent congruence between the personnel records identified by SNAP (Shipboard Non-Tactical ADP Program) Automated Medical System (SAMS) and Composite Health Care System (CHCS). The reliability of CHCS to link ship board personnel to their proper command unit identification code (UIC) is needed to conduct epidemiological research and disease management interventions. Population health data systems in the Navy require the ability to identify individuals who have disease risk factors and facilitate connecting those at risk with health care providers. Informal interviews with health care providers has highlighted a potential incongruence between the sailors listed on a ship's roster in the SAMS database and clinical data in CHCS. The accuracy of clinical data systems needed to be determined in order to identify potential data sources for further research.

Population health and disease management strategies have been identified as critical components of Navy Medicines total force protection initiatives ("BUMED Strategic Plan Update", 2004). Disease management initiatives for high volume chronic health conditions are considered essential for improving patient health and reducing health care costs within the Navy and Department of Defense ("FY 2005 BUMED Business Plan", 2004). Consequently, the provision of disease management is mandated by military leaders through formal directives and expected of health care organizations responsible for the health of populations (DODD 1010.10, 2003). Effective disease management programs have two critical components. The first is access to reliable and current clinical information and indicators of specific chronic health conditions such as diabetes, asthma, hypertension, and hyperlipidemia, cervical dysplasia, and depression. Second, is the ability to link identified high-risk patients with clinicians skilled in disease assessment, evidenced-based clinical practice, and patient/family education (DoD Tricare Management Activity, 2001).

Data systems needed for disease management interventions are different for shore based and shipboard sailors. The two critical data systems for this study were CHCS and SAMS. CHCS is the military's computerized provider order entry system supporting over 500 Military Treatment Facilities worldwide. It is one of the world's largest standardized health information systems and provides clinical data to other medical data systems. DoD has used CHCS for over ten years to order and document laboratory tests, radiology exams, perform prescription transactions, document outpatient appointments and other care administered to patients. Disease management screening indicators can be obtained through queries written for diagnostic test values or through proxy measures of medication classifications. CHCS provides real-time access to clinical data, however, this portal has limitations for shipboard medical departments. Discussions with shipboard clinicians identified limitations using CHCS data for case finding and clinical follow-up related to inaccurate UIC entries.

The second data system that has potential use for fleet disease management data is SAMS (Snap (Shipboard Non-Tactical ADP Program) Automated Medical System). SAMS is used for clinical and medical administrative purposes. There is no direct link between SAMS and CHCS. The quality of SAMS clinical data is completely dependent on manual data entry by shipboard personnel and the level of detail required for meeting minimal crew medical readiness standards. A strength of the SAMS data base is that it represents a gold standard for identifying every sailor currently assigned to that ship.

The lack of at least one reliable field that can link the medical data in the above databases severely limits Navy Medicine's goal of providing premium health care to operational forces. A disease management data source is needed that can be used to identify fleet sailors who need focused intervention to maintain combat readiness. Total force protection can not be achieved without the ability to identify and provide timely clinical services to highly mobile operational personnel. In particular, sailors with poorly managed or unmanaged chronic disease conditions become an unplanned loss from the ship during symptom exacerbations. The loss of one sailor with a critical job specialty can cause a ship with limited personnel resources to degrade its mission readiness (Westphal, 2004). This preliminary study was needed to test at least one critical data element for connecting clinical information to the source sailor and command in order to conduct epidemiological and disease management research and clinical interventions. This study addressed a gap in the literature by providing a statistical analysis of actual UIC congruence between SAMS and CHCS versus casual clinician observations.

Method

The minimum unit of observation is the individual listed on a roster and not the source (a ship) of the roster. A minimum sample of 522 observations were needed to describe congruence and to compare if the congruence rates differ between at least two sources. The rosters of at least three ships with crew sizes of 285 – 325 were used to achieve a minimum sample size and assess for potential SAMS list variation between at least two ships. A total of 1500 names were generated by the CHCS query for comparison. This study used a cross-sectional analysis of health care administrative data to describe the level of congruence on a key variable between two databases. A roster of beneficiaries in one data base was compared to a roster generated by the second database. There were no hypothesis tested. A convenience sample of three ships that normally use nurse practitioner services were the source for the three UIC lists. Human Subject Protection approval was obtained prior to data collection. This study was not representative of the fleet as a whole. It is representative of the level of UIC congruence between SAMS and CHCS for active duty shipboard sailors.

Results

A Chi-square test Likelihood Ratio was calculated comparing the result of unit identification code (UIC) rosters between SAMS and CHCS ($n = 1500$) (Table 1). A significant interaction was found (Likelihood Ratio (1) = 686.66, $p < .001$). Because one cell had less than 5 observations the Fisher's Exact Test was conducted and showed a significant difference ($p < .001$) as well. The CHCS generated UIC roster was able to correctly identify 44.9% of the sailors actually assigned to a ship. The overall congruence between the CHCS and SAMS generated rosters was 25.8%. The incongruence in the CHCS generated roster from the SAMS roster included 42.6% of listed sailors for the UIC who were not on a ship and omitted 31.6% of the sailors actually on a ship.

Table 1. SAMS and CHCS Crosstabulation

		CHCS		Total
SAMS		Yes	No	
Count	Yes	387	474	861
Expected Count		588.9	272.1	861.0
% within SAMS		44.9%	55.1%	100.0%
% within CHCS		37.7%	100.0%	57.4%
% of Total		25.8%	31.6%	57.4%
Count	No	639	0	639
Expected Count		437.1	201.9	639.0
% within SAMS		100.0%	.0%	100.0%
% within CHCS		62.3%	.0%	42.6%
% of Total		42.6%	.0%	42.6%
Count	Total	1026	474	1500
Expected Count		1026.0	474.0	1500.0
% within SAMS		68.4%	31.6%	100.0%
% within CHCS		100.0%	100.0%	100.0%
% of Total		68.4%	31.6%	100.0%

A post hoc analysis was conducted to evaluate potential differences between UIC codes for the SAMS and CHCS rosters. A Kruskal-Wallis Test was conducted to assess if there was a difference between generated rosters by UIC. There is a significant difference between the rosters for UIC 2 from UIC 1 (Chi-Square (2) = 225.71, $P < .001$) and UIC 3 (Chi-Square (2) = 224.33, $P < .001$). There were three UIC codes used in the sample. There was a significant interaction found for all three UIC's (UIC1: Likelihood Ratio (1) = 227.59, $p < .001$; UIC2: Likelihood Ratio (1) = 13.23, $p < .001$; UIC3: Likelihood Ratio (1) = 240.91, $p < .001$). There was wide variation between the three UICs for correctly identifying actual crewmembers (UIC1 50.6%, UIC2 26.0%, UIC3 57.7%), overall congruence (UIC1 23.4%, UIC2 25.6%, UIC3 27.7%), listing sailors not on the ship (UIC1 53.7%, UIC2 1.7%, UIC3 51.9%), and omitting crewmembers (UIC1 22.9%, UIC2 72.7%, UIC3 20.4%) (Table 2). It is noteworthy that UIC2 represented a recently commissioned ship, which may have influenced the differences between the three UIC's.

Table 2. SAMS and CHCS Crosstabulation by Ship

		CHCS		
Ship 1		Yes	No	Total
Count	SAMS	123	120	243
Expected Count		187.5	55.5	243.0
% within SAMS	Yes	50.6%	49.4%	100.0%
% within CHCS		30.4%	100.0%	46.3%
% of Total		23.4%	22.9%	46.3%
Count		282	0	282
Expected Count		217.5	64.5	282.0
% within SAMS	No	100.0%	.0%	100.0%
% within CHCS		69.6%	.0%	53.7%
% of Total		53.7%	.0%	53.7%
Count	Total	405	120	525
Expected Count		405.0	120.0	525.0
% within SAMS		77.1%	22.9%	100.0%
% within CHCS		100.0%	100.0%	100.0%
% of Total		77.1%	22.9%	100.0%
Ship 2				
Count		76	216	292
Expected Count		79.6	212.4	292.0
% within SAMS	Yes	26.0%	74.0%	100.0%
% within CHCS		93.8%	100.0%	98.3%
% of Total		25.6%	72.7%	98.3%
Count		5	0	5
Expected Count		1.4	3.6	5.0
% within SAMS	No	100.0%	.0%	100.0%
% within CHCS		6.2%	.0%	1.7%
% of Total		1.7%	.0%	1.7%
Count	Total	81	216	297
Expected Count		81.0	216.0	297.0
% within SAMS		27.3%	72.7%	100.0%
% within CHCS		100.0%	100.0%	100.0%
% of Total		27.3%	72.7%	100.0%
Ship 3				
Count		188	138	326
Expected Count		259.6	66.4	326.0
% within SAMS	Yes	57.7%	42.3%	100.0%
% within CHCS		34.8%	100.0%	48.1%
% of Total		27.7%	20.4%	48.1%
Count		352	0	352
Expected Count		280.4	71.6	352.0
% within SAMS	No	100.0%	.0%	100.0%
% within CHCS		65.2%	.0%	51.9%
% of Total		51.9%	.0%	51.9%
Count	Total	540	138	678
Expected Count		540.0	138.0	678.0
% within SAMS		79.6%	20.4%	100.0%
% within CHCS		100.0%	100.0%	100.0%
% of Total		79.6%	20.4%	100.0%

Conclusion

This study was conducted to test the congruence of a critical data element (a sailor's UIC) between the dominant clinical database (CHCS) and a known list of actual crewmembers (SAMS). The overall congruence between the CHCS and SAMS generated rosters, however, was only 25.8%. The incongruence in the CHCS generated roster included 42.6% of listed sailors for the UIC who were not on a ship and omitted 31.6% of the sailors actually on a ship. CHCS generated UIC identifiers are not reliable for case finding or for clinical follow-up. The implication for this study is that the electronic medical record alone cannot provide accurate data for determining chronic disease prevalence rates of sailors in particular occupational settings.

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